
The CADD Basics

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The CADD Basics

Note:

This condensed version of CADD PRIMER is intended to give you an overview of CADD. It includes only important topics from CADD PRIMER. It does not include any diagrams. CADD PRIMER includes more than 100 diagrams that illustrate the working of CADD. For complete understanding of CADD refer to CADD PRIMER. This complete book is available for download for \$9.95 at <http://www.caddprimer.com> or you can order printed copies through the publisher listed at the end of this chapter.

About this Chapter

This chapter provides an overview of CADD functions. It describes what various functions will accomplish, how they are organized into CADD menus and how to use them.

You will learn to use basic functions to draw lines or circles, enter text, etc. A brief exercise walks you through the use of these functions. You will also learn how to measure distances and how to locate exact points. This chapter illustrates how to use coordinate methods, such as absolute coordinates, relative coordinates and polar coordinates to measure distances.

In addition, this chapter highlights important principles in setting up CADD drafting standards. It demonstrates how to set up a prototype CADD drawing for a quick start.

Finally, this chapter shows you how to save drawings and where to store them. In this section, you will learn about data saving functions and safety measures to prevent data loss.

Key Terms in this Chapter

Term	Description
Absolute coordinates	Distances measured from a fixed reference point.
Aperture	Effective diameter of the cursor on the screen.
Cartesian coordinates	A rectangular system of measurement to locate points in the drawing area.
Object snaps	A method for indicating point locations using existing drawing objects as a reference.
Origin point	The 0,0 location of the coordinate system.
Polar coordinates	A system to locate the points using an angle and distance.
Prototype drawing	A template drawing that has a number of preset defaults.
Relative coordinates	Distances measured from the last location of the cursor.
User-defined coordinate system	A mode of measurement that allows the user to set up a customized coordinate system.

Components of a CADD Drawing

CADD drawings are created by drawing individual components (also called drawing objects or entities) of the drawing such as lines, arcs, dimensions and symbols. On a drawing board, you may not notice how many lines and arcs you need to complete a diagram, but with CADD you need to be specific. You need to specify exactly what you want to draw and how you want to draw it. Consider this scenario: drawing a square with rounded edges. Using a drawing board, you would quickly draw four lines and round off the edges with a template. Using CADD to draw the similar square, you will have to draw four lines and four arcs separately. You must specify where each line and arc starts, where it ends, the center point of the arc, the radius, etc. (Illustrated with Fig. In CADD PRIMER)

CADDs drawing functions are used to create each component of a drawing such as lines, arcs, circles, ellipses, symbols, text, dimensions pointers, polylines, borders and patterns. You can complete most of the drawings by using these components of CADD.

To draw any component of the drawing, you need to access a particular function from the Draw menu. There are separate functions to draw text, dimensions, patterns, symbols, and other elements of a drawing. To draw a symbol, such as an octagon, you don't need to draw each side one by one. The Symbol function allows you to instantly insert a symbol into the drawing. Similarly, when you need to draw hatch patterns, borders, or arrows, separate CADD functions enable you to do that.

Drawing a component is quite straightforward. When you enter a command, the corresponding menu displays a prompt that guides you through steps to take. To complete a task, you will need to enter data using the keyboard, make selections from sub-menus, and enter points with the help of a pointing device to indicate where you want to position a drawing component.

Beginning to Draw

Refer to CADD PRIMER for a basic drawing exercise.

The Coordinate System

The coordinate system is another method of locating points in the drawing area. It enables you to locate points by specifying distances from a fixed reference point. You can locate a point by giving its distance in the horizontal direction, vertical direction, measuring along an angle, etc. (Illustrated with Fig. In CADD PRIMER)

The coordinate system is available when a function requires data input in the form of point locations. You may use it while drawing, editing or any time you need to locate a point. The most common coordinate systems are as follows:

- Cartesian coordinates
- Polar coordinates

Note:

The method of entering coordinates varies from one program to another. For example, in AutoCAD, the coordinates can be entered directly in the command window with the keyboard. In MicroStation and Cadkey, special dialog boxes let you enter the coordinates.

Cartesian Coordinates

Cartesian coordinates is a rectangular system of measurement that enables you to locate points with the help of horizontal and vertical coordinates. The horizontal values, called X-coordinates, are measured along the X-axis. The vertical values, called Y-coordinates, are measured along the Y-axis. The intersection of the X- and Y-axes is called the origin point, which represents the 0,0 location of the coordinate system. (Illustrated with Fig. In CADD PRIMER)

The positive X values are measured to the right and the positive Y values are measured above the origin point. The negative X and Y values are measured to the left and below. To enter a coordinate, you need to enter both the X and Y values separated by a comma (X, Y).

Polar Coordinates

Polar coordinates allow you to define a point by specifying the distance and the direction from a given point. This mode of measurement is quite helpful in working with angles. To draw a line at an angle, you need to specify how long a line you want to draw and specify the angle. (Illustrated with Fig. In CADD PRIMER)

The Formats to Enter Coordinates

Cartesian or polar coordinate values can be entered in two formats:

- Absolute
- Relative

Absolute format is a way of measuring distances from a fixed reference location (origin point), which is the 0,0 location of the coordinate system. Consider this point to be stationary at all times. In some CADD programs this point remains visible at the left bottom corner of the drawing area, while in others it is invisible. You can use this point as a reference to measure any distance in the drawing. Absolute coordinates are primarily used to adjust the alignment of diagrams in a drawing, to align one drawing with another or to make plotting adjustments.

Relative format is a way of measuring distances from the last point entered. All measurements are taken the same way as the absolute coordinates, with the only difference being that the relative coordinates are measured from the last point entered instead of the origin point. When a point is entered, it becomes the reference for entering the next point and so on. This mode of measurement is frequently used for drawing because it is always convenient to place the drawing components relative to each other rather than a fixed reference point.

Note:

Each CADD program uses its own annotations to enter absolute or relative coordinates. The task table located at the end of the chapter shows some examples from leading CADD programs.

User-Defined Coordinate System

CADD allows you to create a user-defined coordinate system that can help simplify drawing. When you need to work with a complex drawing that has many odd angles this mode of measurement is very useful.

Lets say you need to draw or modify an odd-shaped diagram, it is very difficult to use Cartesian or polar coordinates because they would involve extensive calculations. In this case, you can create a custom coordinate system that aligns with the odd angles of the diagram.

To define a new coordinate system, you need to specify where you want the origin point and the direction of the X and Y-axis. The computer keeps working according to this customized coordinate system unless you set it back to normal.

Important tip:

The user-defined coordinate system is especially helpful when you are working with 3D. In a 3D drawing, you need to define each point with three coordinates and work with various surfaces of a 3D model. The user-defined coordinate system allows you to align coordinates with a specific surface, greatly simplifying 3D drawing (illustrated in Chapter 7 Introduction to 3D).

A Prototype CADD Drawing

A CADD program is designed to meet the needs of a vast number of individuals. It comes with a number of options that can be customized. For example, architects, engineers and surveyors use different annotations to measure units and to draw dimensions. You may have a number of preferences regarding a specific style of text, standard sheet sizes, names of layers, symbol styles, borders, or line types to be used in a project.

When you install a CADD program, it does not have any of the defaults set as per your requirements. You can create a prototype drawing and specify all the defaults that you would like to use. This prototype drawing acts as a template that can be used for all future projects.

This topic is further described in CADD PRIMER.

What if You Made a Mistake

If you make a mistake in issuing a command or in entering any data, you can fix it without many hassles. CADD provides a very convenient way to fix mistakes. Most CADD programs have a built-in function (commonly known as UNDO) that instantly reverses the effect of the last command entered. Many programs allow you to use this function multiple times, so you can go back many steps to fix the mistakes. However, it is always better to take quick action as soon as you realize that a mistake has been made, because the more you go forward with the mistake, the harder it may be to fix it.

When to Save the Drawing or Quit

When you feel that sufficient work has been completed, you should save the drawing. As a guideline, approximately 15-minute interval is considered appropriate to save your work. This ensures that if you lose your drawing for any reason, you will only lose a maximum of 15 minutes worth of work.

You can save the drawing in two ways: save the drawing with the same name or save the drawing with a different name. When you save the drawing with the same name, it overwrites the old information on the disk with the current information. Before issuing this command, you must ensure that you no longer need the old information. When you save the drawing under a different name, it makes a copy of the drawing and leaves the original data on the disk undisturbed.

There are times when you may not want to save a drawing at all. When you make an irretrievable mistake, you may not want to save it. If you save, it will replace the last updated drawing on the disk with the damaged drawing. If the drawing seems to be damaged, it is better to just exit the drawing. You will lose the work you did since the last time you saved it, but it may be better to revert to the last version of the drawing.

Automatic Data Saving Features

CADD comes with a number of built-in safety features that can help safeguard data. Most CADD programs automatically create a back-up file when you save a drawing. The back-up file contains the original information that was in the file before you saved it. So, if you save a drawing and later realize that you need the earlier version, you can retrieve the original information from the back-up file.

This topic is further described in CADD PRIMER.

CADD Filing System

The computer stores information in blocks of data called files. Each drawing created with CADD is stored as a separate data file. Similarly, if you create documents using other programs such as a word processor or spreadsheet, then these too are stored as separate data files.

In addition to data files, system software and application programs have hundreds of files of their own. The computer can be used to store and manage thousands of files depending on the available memory. To manage a large amount of files, good file organization is very important.

Files are organized in directories that make it easy for you to locate them. A directory is like a file folder that may contain any number of files. Sub-directories can be created within a directory that can be used to store groups of files. Each file is identified by its name, directory and sub-directories.

This topic is further described in CADD PRIMER.

A Word about Data Security

The most important task while working on a computer is to safeguard data. Data may be lost due to any number of reasons. Your hard disk may be damaged or data on it may be corrupted. You may forget to save your work and turn off the computer. You may erase a file when you meant only to move or copy it. A computer just follows instructions and takes action in a split second. You can lose hundreds of files within seconds just by pressing a wrong button.

The most important way to safeguard data is to organize your data and take preventive measures. You need to develop standards for naming and organizing files and directories. You need to create directories and sub-directories to store different projects. You need to segregate old work from new work and classify files according to dates, projects, user names, etc.

Make back-up copies of whatever you do. After each working session, store your work on floppy disks as well as the hard disk. Keep a written record of what the files contain. Develop a timetable for how often you will back up your entire hard disk to a back-up tape or other storage device. Keep multiple back-up copies according to dates and time. Store them at a remote location for safekeeping.

Getting Help

One of the first functions you should learn when starting to work with CADD is how to get help. Most CADD programs come with built-in help features that quickly get you started. Getting help is as easy as typing the word Help on the keyboard or selecting it from the menu. Most CADD programs provide help in the following ways:

- You can choose to use a basic tutorial, which is usually provided with the program. This tutorial gives you a quick tour of all the functions in the program.
- You can display an index that lists all the commands available in the program in alphabetical order. You can view topics on any of the commands listed in the index. These topics display the basic capabilities of the command and the steps required completing it.
- You can usually access task-based help in on-line help provided with the program. Most modern programs also provide context-sensitive help, such as help with dialog boxes, which provides the information you need when you need it.
- You can consult the printed user guides and reference manuals, which are nearly always provided with the program.

AutoCAD, MicroStation and Cadkey Terms

This topic lists important terms used in leading CADD programs. Refer to CADD PRIMER for details.

CADD PRIMER ordering information:

CADD PRIMER is available at 30% off the cover price when you order directly from the publisher at the address listed below or through the web site <http://www.caddprimer.com/discount30.htm>.

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